We claim:

1. A method of determining disturbances when discharging molten metal from a metallurgical container having an outlet into a receiving container, said method comprising the steps of:

(a) directly or indirectly detecting mechanical vibrations caused by the discharge of molten metal through said outlet;

(b) measuring a second property in addition to said mechanical vibrations, wherein said second property varies during the discharging of said molten metal from said first metallurgical container to said receiving container;

How? (c) calculating a sensitivity constant based upon said measuring of said second property; ?

How? (d) comparing said vibrations detected by said measuring device with a desired vibrational characteristic, wherein said desired vibrational characteristic is defined in part by said sensitivity constant; ?

How. Vibrations? (e) analyzing said comparison to determine the existence of said disturbances within said outlet, wherein said detecting of mechanical vibrations, said measuring of said second property, said calculating of said sensitivity constant, and said comparing of said vibrations with a desired vibrational constant, are each conducted substantially simultaneously with each other; and

How? (f) causing said disturbances within said outlet to cease.

2. The method as recited in claim 1, wherein a flow control gate is disposed between said metallurgical container and said receiving container.

3. The method as recited in claim 2, wherein said second property is the position of said flow control gate. col 5 45-55

4. The method as recited in claim 1, wherein said sensitivity constant is calculated based upon the derivative of said second property with respect to time. How?

5. The method as recited in claim 1, wherein said sensitivity constant is calculated by neural network analyis.

6. The method as recited in claim 5, wherein said neural network analysis is conducted on said the measurement of said second property and the derivatives thereof.

7. The method as recited in claim 1, further comprising the step of producing a visual image of the area in the vicinity of said receiving container.

8. The process as recited in claim 7, wherein said visual image is analyzed to determine a characteristic of the surface of said molten metal.

9. A method, for determining the presence and quantity of a slag phase in molten steel being transferred in a teeming operation between originating and receiving metallurgical vessels, of the type wherein a real time video image of the teeming stream is monitored to detect the presence of a slag phase, or conditions conducive to the presence of such a phase, in steel being transferred, the monitored images being processed to provide data used to assess the quantity of slag passed, and means operable to control the rate of and termination of teeming is controlled responsive to the data to terminate teeming; wherein parameters of data generated representing characteristics of the teeming stream image are compared with threshold values to generate at least one signal indicative of the passage of slag, and the threshold values are progressively adjusted responsive to data collected by monitoring plural parameters of the teeming operation selected from predicted teeming duration, weight of the receiving vessel, condition of the means controlling teeming rate, and oxygen content of the molten steel.

10. A method according to claim 9, wherein the means controlling teeming is a tap hole of given diameter, and one of the teeming parameters monitored is selected from the following dependent variables: 1) the cumulative amount of steel passed through the tap hole, or 2) the diameter of the tap hole, or 3) the teeming rate at a given rotation angle of the originating vessel.

11. A method as recited in claim 9, wherein the real time video image is processed using a pass filter that allows the analysis of wavelengths in the near infrared spectrum identified by wavelengths between 700 and 1200 nanometers and excludes lower wavelengths.

12. The method as recited in claim 9, wherein the real time video image is collected by an infrared video camera.

13. The method as recited in claim 9, wherein the characteristics of the teeming stream image includes the division of the teeming stream into bright and dark pixels using a threshold value, the ratio of bright to dark pixels being proportional to the amount of slag passed in any given digitized frame.

14. The method as recited in claim 9, wherein the characteristics of the teeming stream image includes the average and standard deviation of the width of the teeming stream along its length.

15. The method as recited in claim 9, wherein the parameters of the real time video image of the teeming stream and of the teeming operation include derivatives of the parameters with respect to time or other teeming parameters.

16. The method as recited in claim 9, , wherein characteristic image parameter thresholds are modified by the other parameters in accordance with data stored in an expert database.

17. The method as recited in claim 9, wherein the vibration parameter thresholds are modified by neural network analysis.

18. The method as recited in claim 9, wherein the teeming operation is controlled manually in response to generation of the at least one signal.

19. The method as recited in claim 9, wherein the signals generated include a signal indicative of the presence of vortexing in steel being transferred.

20. The method as recited in claim 9, wherein the teeming operation is not terminated but rather the angle of rotation of the originating vessel is adjusted responsive to the signal indicative of vortex so as to suppress vortexing if the monitored parameters indicate the

presence in the originating vessel of a significant quantity of transferable steel.